Claims

1. Apparatus for controlling the flow of fluid into a borehole through a conduit, the apparatus comprising a decelerating means adapted to be positioned within the conduit for slowing down the flow of fluid through the conduit.

2. Apparatus as claimed in claim 1, wherein the decelerating means comprises a passage in the apparatus.

3. Apparatus as claimed in claim 2, wherein the passage is defined by at least one body member having formations thereon.

4. Apparatus as claimed in claim 3, including a shoe adapted for engagement with the at least one body member.

5. Apparatus as claimed in claim 4, including an anti-rotation means to prevent relative rotation of the at least one body member and the shoe.

6. Apparatus as claimed in claim 5, wherein the anti-rotation means includes a device shaped to engage a bore provided in the shoe.

7. Apparatus as claimed in claim 5 or claim 6, wherein the anti-rotation means comprises a tapered edge provided on one of the device and the shoe and

a correspondingly shaped groove provided on the other of the device and the shoe.

8. Apparatus as claimed in claim 6 or claim 7 when dependent on claim 6, including an axial locking means to prevent axial separation of the device and the shoe.

9. Apparatus as claimed in claim 8, wherein the axial locking means comprises a latch provided on one of the device and the shoe, and a groove provided on the other of the device and the shoe.

10. Apparatus as claimed in claim 8 or claim 9 when dependent on claim 5, wherein the anti-rotation means prevents relative rotation of the at least one body member and the shoe once the axial locking means has engaged.

11. Apparatus as claimed in any of claims 3 to 10, wherein the apparatus includes a shroud which is disposed around the at least one body member.

12. Apparatus as claimed in claim 11, wherein the shroud is provided with apertures in the side wall thereof.

13. Apparatus as claimed in any of claims 2 to 12, used in conjunction with equipment having at least one valve, wherein the cross-sectional area of the passage is greater than the cross-sectional area of the at least one valve.

14. Apparatus as claimed in any of claims 2 to 13, wherein the passage has constant dimensions.

15. Apparatus as claimed in any of claims 2 to 14, wherein the boundaries of the passage are smooth and free of obstructions.

16. Apparatus as claimed in any of claims 2 to 15, wherein the passage is inclined relative to the axis of the conduit and wherein deceleration of the fluid is caused by friction between the fluid and the inclined passage.

17. Apparatus as claimed in any of claims 2 to 16, wherein the passage is inclined relative to a plane perpendicular to the axis of the conduit.

18. Apparatus as claimed in claim 16 or claim 17, wherein the inclination of the passage is continual throughout the length of the passage.

19. Apparatus as claimed in any of claims 2 to 18, wherein the passage is uni-directional in the axial direction.

20. Apparatus as claimed in any of claims 2 to 19, wherein the passage includes at least one spiral portion.

21. Apparatus as claimed in claim 20, wherein the angle of the spiral portion of the passage is more than 60 degrees relative to the axis of the conduit.

22. Apparatus as claimed in claim 20 or claim 21, wherein the angle of the spiral portion of the passage is between 70 degrees and 80 degrees relative to the axis of the conduit.

23. Apparatus as claimed in any of claims 2 to 22, wherein the passage includes at least one portion which spirals in a first spiral direction and at least one further portion which spirals in a second opposite spiral direction.

24. Apparatus as claimed in claim 23, wherein a cavity is provided between the at least two oppositely directed spiral passage portions, providing a space in which the fluid changes direction between a first spiral direction and a second spiral direction.

25. Apparatus as claimed in any preceding claim, wherein the decelerating means is adapted to induce turbulence into the fluid.

26. Apparatus as claimed in claim 25, wherein the turbulence is at least partially induced by a direction altering means which causes a change in the flow direction.

27. Apparatus as claimed in claim 25 or claim 26 when dependent on claim 25, wherein the turbulence is induced in the cavity between the at least two oppositely-directed spiral passage portions.

28. Apparatus as claimed in any preceding claim, wherein the conduit comprises drillpipe, tubing, coiled tubing, filtration screen, casing or liner string.

29. A control assembly, including:

control apparatus for controlling the flow of fluid into a borehole through a conduit, the apparatus comprising a decelerating means adapted to be positioned within the conduit for slowing down the flow of fluid through the conduit, the decelerating means comprising a passage in the apparatus;

a conduit in which the control apparatus is located; and

a valve located in the conduit above the apparatus;

wherein the cross-sectional area of the passage in the apparatus is greater than the cross-sectional area of the valve.

30. An assembly as claimed in claim 29, wherein the valve is located in a float collar.

31. A method of controlling the passage of fluid through a conduit located in a borehole, including the step of decelerating the fluid.

32. A method as claimed in claim 31, including the step of causing the fluid to deviate from the

conduit into a passage which is inclined relative to the conduit axis.

33. A method as claimed in claim 32, wherein the fluid is decelerated by friction between the fluid and the boundaries of the inclined passage.

34. A method as claimed in claim 32 or 33, wherein the inclined passage has constant dimensions and the boundaries of the passage are free of obstructions so that the fluid moves along the passage without hindrance.

35. A method as claimed in any of claims 31 to 34, including the step of causing the fluid to travel in a spiral direction.

36. A method as claimed in claim 35, wherein the fluid is caused to travel in a tight spiral so that it travels through a large distance in a small axial space.

37. A method as claimed in claim 35 or claim 36, wherein the fluid is caused to travel in a first spiral direction and subsequently in a second opposite spiral direction.

38. A method as claimed in any of claims 32 to 37 when dependent on claim 32, wherein a float collar having a valve is provided in the conduit above the inclined passage, and wherein the passage has a greater cross-sectional area than the cross-

sectional area of the valve so that the fluid flows without restriction into the passage.

39. A method as claimed in any of claims 31 to 38, including the step of inducing turbulence into the fluid.

40. A method as claimed in claim 39 when dependent on claim 38, wherein the turbulence is induced by causing the fluid to change direction from the first spiral direction to the second spiral direction.

41. A method as claimed in any of claims 32 to 40, wherein the inclined passage is defined by at least one body member having formations thereon and wherein a shroud having apertures in its surface is provided around the body member, the method including the step of passing cement through the passage, some of which exits the passage via the apertures to cement the body member to the conduit.